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"The Right to Information, The Right to Live"

"पुराने को छोड नये के तरफ"
Jawaharlal Nehru
"Step Out From the Old to the New"

IS 11119 (1984): Technical supply conditions for sliding vane rotary air compressors [MED 22: Compressor, Blowers and Exhausters]

"ज्ञान से एक नये भारत का निर्माण"
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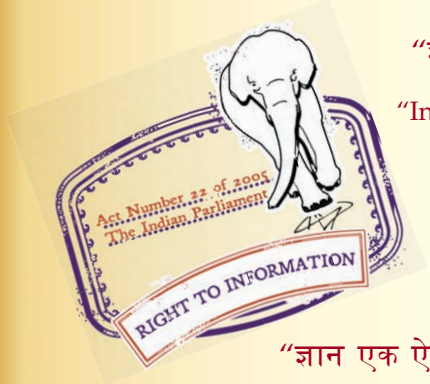

"ज्ञान एक ऐसा खजाना है जो कभी चुराया नहीं जा सकता है"
Bhartṛhari—Nītiśatakam
"Knowledge is such a treasure which cannot be stolen"

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UDC 621·514·22/·24-182·32

Indian Standard

(Reaffirmed 2001)

TECHNICAL SUPPLY CONDITIONS FOR SLIDING VANE ROTARY AIR COMPRESSORS

Compressors Sectional Committee, EDC 62; Panel for Technical Supply Conditions of Various Air Compressor, EDC 62 : P 2 [Ref : Doc : EDC 62 (3238)]

1. Scope — Covers the technical supply conditions for sliding vane type rotary air compressors for general purpose, having not more than 20 bar discharge pressure and capacity not more than 5 000 m^3/h.

2. Terminology — For the purpose of this standard, the terms and definitions as laid down in IS : 5727-1981 ' Glossary of terms relating to compressors and exhausters (*first revision*) ' shall apply.

3. Types

3.1 The sliding vane rotary compressors are generally of the following types:

a) Sliding vane rotary compressor, water cooled type;

b) Sliding vane rotary compressor, oil flooded type;

— Water cooled, and

— Air cooled.

4. Enquiry and Proposal

4.1 *Enquiry*

4.1.1 The purchaser shall complete the data as given in Appendix A to the extent possible and applicable and also specify any known abnormal conditions of working. In addition, purchaser may also specify any of the additional requirements.

4.1.2 A reference to IS : 6206-1971 ' Guide for selection, installation and maintenance of air compressor plants with operating pressures up to 10 bars ' will help the purchaser in framing the specification of compressor and its auxiliaries.

4.2 *Proposals*

4.2.1 The supplier shall include a data sheet in the proposal according to Appendix B. Any other details required by the purchaser shall also be included.

4.2.2 The proposal shall include either a specific statement that all equipment are in strict compliance with the purchaser's specification or a specific list of deviation therefrom shall be furnished.

4.2.3 The supplier shall also submit a list of spare parts for two years normal operation for maintenance of the machine.

4.2.4 The conditions for erection and commissioning of the compressors shall be as agreed to between the supplier and the purchaser.

4.3 *Guarantee*

4.3.1 *Performance guarantee* — The compressor shall be guaranteed for satisfactory performance at the specified operating conditions. These include a guarantee for flow rate and power at the time of performance unless guarantees on other items have been specifically asked by the purchaser. The tolerances to be allowed on the flow rate and power consumption shall be according to IS : 5456-1969 ' Code of practice for testing of positive displacement type air compressors and exhausters '.

4.3.2 *Workmanship guarantee* — All equipment, components and spare parts other than bought out items shall be guaranteed by the supplier against defects which despite proper use appear therein and arise from defective or improper materials or poor or faulty workmanship. This guarantee shall be applicable for a period of 12 months or 2 000 h from the date of installation, whichever is earlier. If any defect or malperformance is established during the guarantee period, the supplier shall make all necessary and desirable alterations, repairs and replacement free of charge.

Note — A list of bought out items shall be furnished to the user. The original manufacturer guarantee shall be passed to the user.

Adopted 27 September 1984

Gr 4

INDIAN STANDARDS INSTITUTION
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI 110002

5. Requirements of Major Assemblies/Sub-Assemblies

5.1 *Compressor*

5.1.1 Compressor, prime mover and auxiliary equipment shall be designed for the required duty at the specified operating conditions, and for rapid and easy maintenance.

5.1.2 Where special area classification for electricals and instrument is specified, these shall be followed for the design and construction of these items to meet the relevant safety requirements.

5.2 *Rotor Chamber*

5.2.1 Surfaces shall be cleaned by sand blasting/shot blasting/pickling, etc. In case grey iron and steel castings are used, they shall conform to IS : 210-1978 'Specification for grey iron castings' and IS : 1030-1974 'Specification for carbon steel castings for general engineering purposes', respectively.

5.2.2 Maximum allowable working pressure shall be at least 110 percent of the rated discharge pressure.

5.2.3 In case of water jacketing the rotor chamber shall have water jacket whose design pressure shall not be less than 0·4 MPa (1 MPa = 10 kgf/cm^2 approximately).

5.2.4 If the design is such that the compressor sleeve is used in rotor chamber then, the suction and discharge port angles shall be specified by the supplier. This will help the end user to get the sleeve of correct angles inserted during subsequent maintenance, if required.

5.3 *Rotor*

5.3.1 The axial clearance and bottom clearance shall be specified by the supplier for the assembly of the rotor.

5.3.2 Type of bearings, their lubrication and the type of fit on the rotor shall also be furnished by the supplier.

5.3.3 The rotor slots shall offer free gliding movement to vanes during operation.

5.4 *Cooling System*

5.4.1 The compressor shall be provided with an efficient cooling system.

6. Prime Mover and Drive Equipment

6.1 In case the prime mover is required to be supplied alongwith the compressor, the purchaser shall specify in the enquiry, the technical data required for the prime mover design (type of motor, electrical supply characteristics, type of engine, etc) and also the standard to which the prime mover shall conform.

6.2 The rated power of the prime mover shall be higher by at least 10 percent from the maximum power required under rated discharge pressure and standard air inlet conditions as defined in IS : 5727-1981 ' Glossary of terms relating to compressors and exhausters (*first revision*) ' (maximum power included shaft power or brake power plus all transmission losses).

6.3 The prime mover shall have sufficient starting torque so as to be capable of starting the compressor from a no-load condition and running it up to full speed.

6.4 When the prime mover is to be procured by the purchaser the supplier shall furnish the following data:

a) Compressor and transmission starting torque characteristics,

b) Inertia value (GD^2), and

c) Mounting or coupling details or both.

6.5 *Coupling* — Various types of coupling, such as friction disc coupling type, internal gear type may be used.

6.5.1 If the coupling used is of cost iron of flexible type, the same shall conform to IS : 2693-1964 ' Specification for cast iron flexible couplings '.

6.5.2 The coupling shall be so designed that they are dismentled without disturbing the internal components of compressors and prime mover.

6.5.3 Coupling shall be suitable for expansion and any other movement of the shaft.

6.6 *Reduction Gears*

6.6.1 Gears shall be of suitable design and made generally conforming to IS : 4702-1968. 'Accuracy requirements for high precision gears'.

6.7 *Belts*

6.7.1 In case of belt drives, the V-belts shall be according to IS : 2494-1974 ' Specification for V-belts for industrial purposes '.

6.7.2 If more than one V-belt is required, a matched set shall be supplied.

7. Auxiliary Equipment

7.1 *Guards*

7.1.1 Removable guards shall be provided on all movable parts which are likely to be hazardous to operating personnel.

7.1.2 If guards are not removable, for example, fly-wheel guards, access openings (if necessary with covers) shall be provided for access to any part requiring attention or for rotary parts manually.

7.2 *Filter*

7.2.1 Purchaser shall specify if there is any particular atmospheric pollution adjacent to the compressor so as to enable the manufacturer to select a proper filter.

7.2.2 The position of filter shall be such as to permit easy cleaning. Filter shall be placed as close to compressor as possible.

7.2.3 The purchaser may specify any special requirement regarding filtering particle size in microns and required efficiency, otherwise manufacturer may furnish his standard filter and state the normal cleaning interval replacement.

7.2.4 For non-lubricated compressors, dry filters shall be furnished.

7.3 *Compressed Air Cooler* — The cooler may be of either water-cooled type or air-cooled type. In case the cooler is of water-cooled type, it shall conform to the following requirements.

7.3.1 Inter coolers and after coolers shall be designed on the air side to the design pressure not less than the safety valve set pressure. The design pressure for the water side shall be 3·5 bar minimum or as specified by the purchaser.

7.3.2 The fouling factor to be used on water side shall be as agreed to between the purchaser and the supplier.

7.3.3 In case shell and tube type of cooler is engaged, the design and construction shall be according to IS : 4503-1967 ' Specification for shell and tube type heat exchangers '. The cooled air shall be brought to within 10°C of cooling water supply temperature.

7.4 *Separators, Traps and Air Receiver*

7.4.1 Proper arrangements shall be made to remove oil and condensate after each air cooler.

7.4.2 If separate separators are provided for the purpose, they shall be of standard quality. The air receiver, if provided, after the final discharge shall be manufactured according to IS : 7938-1976 ' Specification for air receivers for compressed air installation '.

7.4.3 Where automatic drain traps are used, these shall be provided with isolating valves to allow trap maintenance with the compressor running.

7.5 *Piping*

7.5.1 The pipe work required with the compressor consists of:

a) *Air piping* — Inlet and final discharge piping, and

b) *Auxiliary pipe work* — Lubricating oil, cooling water drain and vent, and instrument air piping.

7.5.2 The scope of supply of pipe-work by the supplier shall be properly defined with terminal points clearly fixed. The supplier shall supply all pipe work to inter-connected items of his supply reducing the number of terminal points for the purchaser connection to a minimum.

Auxiliary pipe work, for example, required for lubricating oil, cooling water drain and vent and instrument air shall be machine mounted in fully erected and fabricated condition unless otherwise agreed. The fashion in which the air piping, for example, for inlet and final discharge is to be supplied shall be stated by the purchaser.

7.5.3 The water pipe work shall be fitted with high point vent and low pipe drain connection such that the entire system can be vented and drained.

8. Controls and Instrumentation

8.1 *Instruments* —The following instruments shall be included in supply which are considered as normal requirement. Extra instruments as specified by the purchaser shall also be included.

8.2 Pressure and temperature gauges, flow and level indications.

a) Air side	— outlet pressure gauge — each stage — outlet temperature gauge — final stage
b) Oil side	— Oil level indicator — oil pressure gauge
c) Cooling water side	— Cylinder jacket flow indicator for each parallel circuit if applicable — Temperature gauge at cooling water outlet (optional) — Flowmeter for cooling water (optional)

8.3 *Safety Devices* — A suitable safety devices shall be provided to safeguard against high discharge air temperature.

8.4 *Safety Valves* — Final stage only shall be protected by a safety valve. The valve shall be sized for full capacity of the compressor with set pressure not more than 10 percent of the maximum operating pressure of the stage.

The safety valve shall be mounted in such a manner that the setting is not disturbed by the vibration.

9. Documents — Each compressor shall be supplied with the following documents:

a) user's hand book for compressor and prime mover, if supplied;

b) maintenance manual;

c) guarantee certificate; and

d) part identification list.

10. Marking — Each compressor shall be fixed with a suitable name plate containing the following information:

a) Serial No.,

b) Make and Model No.,

c) Rated discharge pressure,

d) Rated speed,

e) Free air delivery (FAD),

f) Year of manufacture, and

g) Manufacturer's name and address.

10.1 *Rotation* — Arrows showing the direction of rotation shall be cast in or attached to each rotating equipment.

11. Tests

11.1 The test other than hydrostatic and pressure tests, shall be in accordance with IS : 5456-1969 'Code of practice for testing of positive displacement type air compressors and exhausters'.

11.2 *Hydrostatic and Pressure Test* — All pressure containing parts including cooling jackets shall be subjected to hydrostatic test pressure equal to 1·5 times the maximum allowable working pressure. However, this test pressure shall not be lower than 0·7 MPa. The piping, pressure vessels, filters, coolers, and the line shall be subjected to hydrostatic test pressure of 1·5 times the design pressure or in accordance with specified code.

APPENDIX A

(*Clause* 4.1.1)

DATA SHEET CONTAINING PURCHASER'S REQUIREMENTS

A-1. General

a) Installed compressed air capacity required (FAD in m^3/h);

b) Capacity range of each unit;

c) Number of running units;

d) Number of standby units;

e) Operation — Continuous/Intermittent;

f) Type of prime mover — Electric motor/engine turbine;

g) Whether drive to be furnished by supplier or to be arranged by purchaser;

h) Discharge pressure in bar;

j) Discharge temperature limitation, if any;

k) Type of cooling whether air cooled or water cooled;

m) Space limitation, if any; and

n) Insulation details — indoor/outdoor.

A-2. Prime Mover Details

A-2.1 In case of electric motor, whether the following are required or not:

a) Squirrel cage (SPDP/TEFC);

b) Slip ring (SPDP/TEFC);

c) Type of protection;

d) Insulation choice, if any;

e) Whether the equipment has to withstand any tropical conditions/hazardous area, and if so, class/grade/division;

f) Supply voltage at purchaser's end, voltage variation, if any;

g) Details of switch gear in case to be included by supplier;

h) Supply frequency; and

j) Any other details.

A-2.2 In case the prime mover is an engine:

a) Fuel used,

b) Type of cooling — air-cooled/water-cooled,

c) Operating conditions including site details as mentioned in **A-3**, and

d) Any other detail.

A-2.3 In case the prime mover is a turbine:

a) Steam temperature and pressure,

b) Operating conditions including site details as mentioned in **A-3**, and

c) Any other details.

A-3. Operating Conditions

a) Site details, including barometric pressure ..... ;

b) Ambient temperature variation..... maximum..... minimum;

c) Relative Humidity..... ...maximum.....minimum; and

d) Cooling water availability and temperature..... .....maximum.....minimum.

A-4. Type of Control

a) For the battery of compressors, whether mannual, semi-automatic or fully automatic or fully automatic; and

b) Details of control panel and scope of supply.

A-5. Driving Details

a) Direct coupled through semi-elastic coupling, or through centrifugal clutch;

b) V-belt driven; or

c) Flat belt driven; or

d) Reduction gear driven; or

e) Any other type of coupling.

A-6. Scope of Supply

a) Prime mover,

b) Additional instrumentation;

c) Safety devices;

d) Intercooler;

e) Aftercooler;

f) Filter, including type and standard;

g) Silencer;

h) Cooling water pipe and manifold;

j) Instrument panel;

k) Spare parts;

m) Set of tool;

n) Other accessories, if any;

p) Interstage air and water piping; and

q) Air receiver, if required, and its capacity.

A-7. Inspection Procedure and Details of Tests

a) Component inspection, or

b) Interstage inspection, or

c) Assembly inspection, or

d) Running performance test,

e) Hydraulic test of cylinders/cylinder jackets, and

f) Hydraulic test for coolers.

A-8. Acceptable Noise Level at Purchaser's End

APPENDIX B

(*Clause* 4.2.1)

DATA SHEET TO BE ENCLOSED BY THE SUPPLIER ALONGWITH THE PROPOSAL

B-1. Type of Compressors Offered

a) Rotary water

i) Water cooled

ii) Oil flooded

— Water cooled

— Air cooled

b) Number of compression stages

B-2. Capacity — FAD at the rated discharge pressure in m^3/h

B-3. Pressure

a) Maximum allowable working pressure; and

b) Rated discharge pressure in bar.

B-4. Speed

B-5. Prime Mover and Drive Details

a) Type of prime mover included in offer,

b) Type of power transmission arrangement,

c) Shaft power consumption of the compressor at rated speed and rated discharge pressure,

d) Rated power of prime mover at the operating conditions, after deration;

e) Prime mover details including the pre-requisite to be arranged for the same by purchaser, and

f) Details of switch gear/starting device if included in estimate.

B-6. Oil Pump Details

a) Capacity of pump,

b) Viscosity of oil and its flesh point,

c) Oil charge operating period.

B-7. Compressor Details

a) Material of Valve

B-8. Approximate Space Requirement for the Installation

B-9. Details of Accessories Included with Each Unit

EXPLANATORY NOTE

This standard has been prepared with a view to consolidating the information available on sliding vane rotary type air compressor.

Printed at Arcee Press, New Delhi, India

AMENDMENT NO. 1 AUGUST 1989
TO
IS : 11119 - 1984 TECHNICAL SUPPLY CONDITIONS FOR SLIDING VANE ROTARY AIR COMPRESSORS

(*Page* 1, *clause* **4.3.2,** *second sentence*) — Substitute the following for the existing sentence :

'This guarantee shall be applicable for a period of 12 months from the date of supply or 2 000 working hours, whichever is earlier.'

(EDC 62)

Printed at New India Printing Press, Khurja, India